MESSRS. J. B. BAILLIÈRE ET FILS, Paris, have issued the first volume of a work entitled "Éléménts de Paléontologie," by Félix Bernard. No fewer than 266 figures appear in the text. The same publishers have issued in their "Bibliothèque Scientifique Contemporaine" a book on "Les Lichens," by A. Acloque. He deals with the anatomy, physiology, and morphology of the lichenic organism.

MESSRS. GEORGE BELL AND SONS have issued the second volume of Mr. George Massee's "British Fungus-Flora," a classified text-book of mycology. The work will be completed in three volumes.

PROF. B. KOTÔ has contributed to the Journal of the College of Science, Imperial University, Japan (vol. v. part 3) a learned paper on the Archæan formation of the Abukuma Plateau. The paper is illustrated with several plates.

MESSRS. BAILLIÈRE, TINDALL, AND COX have published a second edition of Veterinary Captain F. Smith's "Manual of Veterinary Hygiene." The only important alterations in the book are those in the chapter on ventilation.

A VALUABLE "Catalogue of American Localities of Minerals," by Prof. E. S. Dana, has been reprinted by Messrs. John Wiley and Sons from the sixth edition of Dana's "System of Mineralogy."

THE Wagner Free Institute of Science proposes to issue a reprint of T. A. Conrad's monograph of "The Medial Tertiary Fossils of the United States," if subscriptions for 150 copies can be obtained. The original plates would be reproduced by a process of photo-engraving, and a brief introductory chapter and a table would show the present state of the nomenclature of the species contained in the work.

STARTING with an observation by Herz, that the cathode rays causing phosphorescence can pass through thin metallic plates, Herr Lenard has recently made some interesting experiments (described to the Berlin Academy) with an arrangement in which the rays from a small aluminium disc (as cathode) were projected on a thin aluminium "window" (0·003 mm. thick), in a thicker metal plate at the opposite end of the tube. The lateral anode was connected to earth, and a large inductorium was discharged through the tube. These cathode rays passed through the window, and made the air faintly luminous, with bluish light, brightest at the surface of the window. There was a strong smell of ozone. Phosphorescent bodies, bodies brought near the window, glowed, having the same colour as *in vacuo*. At about 2·4 inches distance the phenomenon ceased; it also ceased when the cathode rays were deflected with a magnet, or when a screen of sufficient thickness was interposed. But owing to diffuse spread of the rays the phosphorescent action extended into the shadow of the opaque screen. This field of observation beyond the window could be enclosed and evacuated, and the higher the vacuum, the greater was the distance at which phosphorescence took place, and the sharper and brighter were the rays—indicating (in the author's opinion) that these cathode-rays are a process in the ether. Herr Lenard tried other gases besides air, and found varying penetration by the rays. When coal gas was let pass between the window and the phosphorescent body the latter brightened. When the field of observation (enclosed) was filled with hydrogen at atmospheric pressure, the phosphorescence extended thrice as far as in air at the same pressure (viz. to about 8 inches). Oxygen and carbonic acid were less penetrable than air. "One may say that hydrogen molecules cause less turbidity in the ether than those of oxygen, and the latter less than those of carbonic acid."

NOTES from the Marine Biological Station, Plymouth:—Last week's captures include the Nemertine *Lineus marinus* (=*longissimus*) and the long-spined sea-urchin (*Echinus acutus*). In the floating fauna the principal change has consisted in a great reduction in the numbers of Echinoderm larvæ and in the gradual disappearance of *Aurelia*-ephyræ, as well as in the appearance of numbers of *Arachnactis* (larva of the Actinian *Cereanthus*), of the Leptomedusa *Irene pellucida* (Claus, *non* Haeckel), and of a few *Porcellana* larvæ. In addition to these, small *Obelia* medusæ and the Appendicularian *Oikopleura dioica* have been abundant, and young Ctenophores and Planarians have been occasionally present. The Hydroid *Eudendrium ramosum*, the Nemertine *Amphiporus pulcher*, and the crab *Portunus arcuatus* are now breeding.

THE additions to the Zoological Society's Gardens during the past week include a Mozambique Monkey (*Cercopithecus pygerythus*, ♀) from Zanzibar, presented by Mr. C. E. Reynolds; a Macaque Monkey (*Macacus cynomolgus*) from India, presented by Mr. J. W. Jones; a Coypu (*Myopotamus coypus*) from South America, presented by Mr. Arthur Hunt; a double-banded Sand Grouse (*Pterocles bicinctus*) from Senegal, presented by Mr. H. H. Sharland, F.Z.S.; three Common Peafowls (*Pavo cristatus*, ♂ ♂ ♀) from India, presented by Mr. W. Murphy Grimshawe; ten —— Fishes (*Giradinus guppyi*) from Trinidad, presented by the Marquis of Hamilton; a Hawfinch (*Coccothraustes vulgaris*), four Bramblings (*Fringilla montifringilla*) British, purchased; a Hog Deer (*Cervus porcinus*) born in the Gardens.

OUR ASTRONOMICAL COLUMN.

COMET HOLMES (1892 III.).—Prof. Keeler, in speaking of the hypothesis that this comet has been produced by a collision between two asteroids, says that the character of the spectrum has little to support this view. He accounts for the brightening on January 16 by supposing that an increase in the number of reflecting particles in the space surrounding the comet took place, *i.e.* by an increase of density, which might result from a contraction following the previously observed expansion of the comet, or, which is more in accordance with the observations, from fresh emanations from the nucleus (*Astronomy and Astrophysics* for March).

Apropos of the same hypothesis, Prof. C. A. Young queries whether, if the asteroids were formed by a series of "explosions," breaking up first the original planet and afterwards the pieces from it, this might not be an event of that sort—an eruption from an asteroid. We continue the ephemeris for the week:—

12*h*. *Paris Mean Time*.

1893.	R.A. (app.) h. m. s.	Decl. (app.) ° ′ ″
March 30	3 20 48·7	+36 7 2
31	22 38·7	9 44
April 1	24 28·9	12 25
2	26 19·2	15 5
3	28 9·7	17 44
4	30 0·3	20 22
5	31 51·1	22 58
6	3 33 42·0	36 25 33

WOLSINGHAM OBSERVATORY, Circular No. 34.—The star Es-Birm 180 6h. 15·5m. + 47° 43′ was found to be 10·5 March 20 and is variable. On March 18, a red III. Type star, 8·5 mag. was seen at 3h. 23·5m. + 58° 11′ and may be variable. Not in D.M. Places for 1900.

JUPITER AND HIS SATELLITES.—Writing from Arequipa, Peru, Prof. Pickering communicates to *Astronomy and Astrophysics* for March an account of the very valuable and important observations that he made during the past favourable opposition of the planet Jupiter. A minute study of the planet's surface gave him the impression that his surface consists of a "uniform white mass of cloud," over which is stretched a gauzy and thin veil "of a brown material, resembling in struc-

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ture our cirrus clouds. Where this veil occurs in denser masses there are the belts, and the phenomena of white spots is nothing less than holes in this veil itself exposing the uniform white layer below. During this period of observation the great red spot was extremely faint and seemed to belong to the white portion beneath, being apparently seen through a hole in the gauzy structure. Since October 8 last, when Prof. Pickering commenced a series of measures with the 13-inch telescope of the diameters of the satellites, some most interesting results have been forthcoming. It was on that day also that he observed one of these small bodies first as an elliptical figure, and then afterwards as a circular one, and later he had the good fortune to watch and observe the disc as it gradually began to assume the elliptical form. After this observation it was found that the other three satellites had at some time been reported as representing an elliptical disc, the shortening taking place equatorially, thus they would seem to revolve about their minor axes. To make quite sure that this was the case and not the result of some optical delusion, Prof. Pickering seems to have instituted various experiments, but the elongations, as he says, "nevertheless remained persistent in the same direction." The first satellite then is a prolate ellipsoid revolving about one of its minor axes in a period of 13h. 3m., while the other three assume at regular intervals the form of ellipses, these periodic changes being produced by the rotation upon their axes.

With respect to the second satellite, the shape of which, by the way, is put down as that of an ellipsoid of three unequal axes revolving about the middle one, and whose period of rotation is 41h. 24m., a curious observation was made in December last. Just about the time of occultation, the equatorial diameter being "decidedly shortened," the satellite retained its shape until almost in contact with the limb, when suddenly "the major axis of its ellipse changed its position angle through thirty degrees, becoming parallel to the limb of the planet." With regard to the other two satellites Prof. Pickering mentions many new facts relating to colour, size, rotation, &c., too numerous to refer to here, but we may say that he has been led to the conclusion that all the four satellites are nothing more than condensed swarms of metorites, like Saturn's ring. In the case of each satellite he gives an ephemeris which indicates the time at which each presents its maximum elliptical phase.

The Horizontal Pendulum.—In a volume of 216 pages entitled "Das Horizontal Pendel und seine Anwendung zur Beobachtung der absoluten und relativen Richtungs-Aenderungen der Lothlinie," Dr. E. von Rebeur-Paschwitz brings together all his observations made in the years 1889–92 at the observatories at Wilhelmshaven and Potsdam, and also in Puerto-Orotava on Teneriffe. Besides containing a long discussion on the observations themselves, a very useful collection with short notes of the literature on this subject is added. The pendulum, which was of an isoceles triangle shape, carried a small mirror at the middle part of the shortest side, the movements of which were photographically recorded with the help of sensitised paper and an oil lamp. In addition to numerous seismical appearances, three distinct periodic pulsations were recorded. The first he says is with great probability due to the different positions of the moon, and after supplying the terms containing lunar factors he finds a close agreement between the observed and calculated values—the observations indicating the existence of a tide with a coefficient of $0''\cdot01$. With regard to the daily period, he finds that these movements are by no means local, but quite general over the earth's surface; the real cause of these motions do not seem to have been fully brought home, as the magnitudes of the amplitudes seemed to differ considerably locally; but in a note Dr. Paschwitz mentions that the action of the moon on the daily period is in all cases of great importance. The third and last movement, that of the motion of the zero-point, seems to be totally dependent on meteorological conditions.

The Rising and Settings of Stars.—At the present day there are many who are interested in the calculation of star places, times of rising of stars, &c., for times very remote, such as, for instance, in the solution of such problems that have arisen with regard to the orientation of temples, occultations, eclipses, &c. Where we now use the meridian, our early ancestors adopted the horizon, and it was to this plane that they referred many of their astronomical measurements. The heliacal rising and setting, and the cosmical rising and setting are only some of the expressions that were in use to define different relations between heavenly bodies and the horizon at a given time, and only quite recently has the importance of such terms as these been pointed out. In a late publication of the *Astronomischen Gesellschaft*, Bd. xx. Dr. Walter F. Wislicenus has worked out a set of tables for the computation of the yearly risings and settings of stars, and the special problems which can more easily with their help be solved may be stated as: (1) Given ϕ, ϵ, α, δ the latitude, obliquity of ecliptic and coordinates of a certain star for a certain year to find the longitude of the sun at the time of the heliacal rising. (2) Given ϕ, ϵ, for a certain date, and λ for the heliacal rising of an unknown star to find α and δ. (3) Given ϵ, α, δ, for a certain date and also the value of λ at the time of the heliacal rising to find ϕ the place of observation.

GEOGRAPHICAL NOTES.

French exploration towards Lake Chad is being carried on steadily and successfully. The latest results have been obtained by M. Maistre, who set out from the Mobangi in July, 1892, traversed the south of Bagirmi through the Shari valley, and entered Adamawa by a route never before traversed by Europeans, ultimately descending the Niger, where the expedition reached Akassa on March 25. The health of the expedition was good, and in the earlier part of their work friendly relations were kept up with the natives. In Adamawa, however, there were hostile encounters.

Mr. Mackinder concluded his course of educational lectures for the Royal Geographical Society last week by a masterly discussion of some of the geographical aspects of British history. The effect of the position of the British Isles on their history was summarised concisely in the statement that Britain stands out of the continental world, yet looks into it through its south-east window, and looks not merely into the world, but into the great historic avenue of the world's life. Naturally, therefore, the centre of Britain's national and commercial life has been drawn eccentrically to the south-east corner. This accounts for the inevitable position of London. The configuration of the country, with its natural zones of highlands and lowlands, led with equal clearness to the distribution of peoples and interests, which caused the historic opposition of England and Scotland.

Mr. and Mrs. Theodore Bent, after some delay at Massowa, on account of tribal wars, reached Adowa on the way to Aksum in the middle of February. At Adowa there are Himyaritic ruins of some importance, which Mr. Bent proposes to study before going on to Aksum, where he hopes to have several weeks of active archæological research.

In a recent report on the triangulation of the north-west portion of South Australia, published by the Government of that colony, the work of the surveyors during the last few years is briefly summarised. From 1888 to 1890 16,000 square miles were surveyed in the form of a belt, about fifty miles wide, stretching from the Anthony Range to the western boundary of the province, a distance of 320 miles. Up to the end of the 1892 season 11,300 square miles of additional land were surveyed. The work in many places was extremely arduous on account of want of water, a supply for the camels having sometimes to be carried for more than forty miles, and for more than a year no rain whatever fell.

THE INSTITUTION OF NAVAL ARCHITECTS.

The annual spring meeting of this Institution was held last week in the hall of the Society of Arts on Wednesday, Thursday, and Friday, March 22, 23, and 24. There was a fair number of papers on the agenda, of which the following is a list:—

On the present position of the cruiser in warfare, by Rear-Admiral S. Long. Merchant cruisers considered with reference to the policy of maintaining a reserve of vessels by annual subventions to shipowners, by Lord Brassey. Some considerations relating to the strength of bulkheads, by Dr. F. Elgar. On the measurement of wake currents, by George A. Calvert. On the new Afonasieff's formulæ for solving approximately various

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